1: Biotechnol Adv. 2002 Nov;20(3-4):191-213. Related Articles, Link

Cellulose-binding domains. Biotechnological applications.

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Many researchers have acknowledged the fact that there exists an immense potential for the application of the cellulose-binding domains (CBDs) in the field of biotechnology. This becomes apparent when the phrase "cellulose-binding domain" is used as the key word for a computerized patent search; more then 150 hits are retrieved. Cellulose is an ideal matrix for large-scale affinity purification procedures. This chemically inert matrix has excellent physical properties as well as low affinity for nonspecific protein binding. It is available in a diverse range of forms and sizes, is pharmaceutically safe, and relatively inexpensive. Present studies into the application of CBDs in industry have established that they can be applied in the modification of physical and chemical properties of composite materials and the developmen of modified materials with improved properties. In agro-biotechnology, CBDs can be used to modify polysaccharide materials both in vivo and in vitro. The CBDs exert nonhydrolytic fiber disruption on cellulose-containing materials. The potential applications of "CBD technology" range from modulating the architecture of individual cells to the modification of an entir organism. Expressing these genes under specific promoters and using appropriate trafficking signals, can be used to alter the nutritional value and texture of agricultural crops and their final products.

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Exhibit A

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Figure 4-39. Three types of matrices used for chromatography. In ion-exchange chromatography (A) the insoluble matrix carries ionic charges that retard molecules of opposite charge. Matrices commonly used for separating proteins are diethylaminoethylcellulose (DEAE-cellulose), which is positively charged, and carboxymethylcellulose (CM-cellulose) and phosphocellulose, which are negatively charged. The strength of the association between the dissolved molecules and the ion-exchange matrix depends on both the ionic strength and the pH of the solution that is passing down the column, which may therefore be varied in a systematic fashion (as in Figure 4-40) to achieve an effective separation. In gel-filtration chromatography (B) the matrix is inert but porous. Molecules that are small enough to penetrate into the matrix are thereby delayed and travel more slowly through the column. Beads of cross-linked polysaccharide (dextran or agarose) are available commercially in a wide range of pore sizes, making them suitable for the fractionation of molecules of various molecular weights, from less than 500 to more than 5 x 10^6. Affinity chromatography (C) utilizes an insoluble matrix that is covalently linked to a specific ligand, such as an antibody molecule or an enzyme substrate, that will bind a specific protein. Enzyme molecules that bind to immobilized substrates on such columns can be eluted with a concentrated solution of the free form of the substrate molecule, while molecules that bind to immobilized antibodies can be eluted by dissociating the antibody-antigen complex with concentrated salt solutions or solutions of high or low pH. High degrees of purification are often achieved in a single pass through an affinity column.

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